

Disadvantages of a single table database

- Redundancy of data
- Problem with complex data
- Problems in updating in bulk (new phone number)
- Problems in adding incomplete data (new publisher)
- Problems in removing group of data (all books from the publisher)

Solution:

Relational Database Management System (RDBMS)

- E.g. Microsoft Access

Relational Database

- System of related tables
- Minimum redundancy
- Referential integrity
- Database keys
- The ACID model (guarantee of successful transactions):
 - Atomicity („all or nothing” rule)
 - Consistency (only valid data in)
 - Isolation (order of executed transactions)
 - Durability (committed transaction will not be lost)

Home library – table Books

ISBN	Title	PubID	Price
0-103-45678-9	Iliad	1	25.00 zł
0-11-3-45678-9	Moby Dick	3	49.00 zł
0-12-333433-3	On Liberty	1	25.00 zł
0-123-45678-0	Ulysses	2	34.00 zł
0-12-345678-9	Jane Eyre	3	49.00 zł
0-321-32132-1	Balloon	3	34.00 zł
0-55-123456-9	Main Street	3	23.00 zł
0-555-55555-9	Macbeth	2	12.00 zł
0-91-045678-5	Hamlet	2	20.00 zł
0-91-335678-7	Faerie Queen	1	15.00 zł
0-99-777777-7	King Lear	2	49.00 zł
0-99-999999-9	Emma	1	20.00 zł
1-1111-1111-1	C++	1	30.00 zł
1-22-233700-0	Visual Basic	1	25.00 zł

Home library – table Publishers

PubID	PubName	PubTel
1	Big House	123-456-7890
2	Alpha Press	999-999-9999
3	Small House	714-000-0000

Database Normalization Basics

- Third Normal Form (3NF)
 - meet all requirements of the 2NF
 - remove columns that are not dependent upon primary key

- Example

{ISBN, Title, NumberOfBooks, UnitPrice, TotalValue}

where: $\text{TotalValue} = \text{NumberOfBooks} * \text{UnitPrice}$

Correct form:

{ISBN, Title, NumberOfBooks, UnitPrice}

Decomposition of tables

- Relations between data must be conserved

AuID	AuName	PubID
A1	Smith, John	P1
A2	Smith, John	P2

- Decomposition

AuID	AuName
A1	Smith, John
A2	Smith, John

AuName	PubID
Smith, John	P1
Smith, John	P2

- Display all John Smiths

AuID	AuName	PubID
A1	Smith, John	P1
A1	Smith, John	P2
A2	Smith, John	P1
A2	Smith, John	P2

Example: Relation ORDERS not normalized

No_order	IDsupplier	Name_Supplier	Address_Supplier	IDpart	Name_part	Qty	Warehouse	Address_Warehouse
001	300	VW	Wolfsburg, Roteastrasse 10	53	Carburetor	100	5	Warszawa, Chopina 3
				57	Crankshaft	50	5	Warszawa, Chopina 3
				59	Mudguard	500	6	Warszawa, Mozarta 25
002	400	WSK	Świdnik, Kraszewskiego 5	54	Carburetor	500	5	Warszawa, Chopina 3
				32	Wheel	100	6	Warszawa, Mozarta 25
003	500	VW Polska	Antoninek, Słowackiego 2	88	Engine	15	7	Warszawa, Bacha 3
004	600	FIAT	Bielsko-Biała, Mickiewicza 25	58	Mudguard	400	6	Warszawa, Mozarta 25
				21	Alternator	50	7	Warszawa, Bacha 3
005	300	VW	Wolfsburg, Roteastrasse 10	53	Carburetor	200	5	Warszawa, Chopina 3
				57	Crankshaft	30	5	Warszawa, Chopina 3
006	300	VW	Wolfsburg, Roteastrasse 10	59	Mudguard	20	6	Warszawa, Mozarta 25

Relation ORDERS in the third normal form (3NF)

remove column not dependent upon primary key

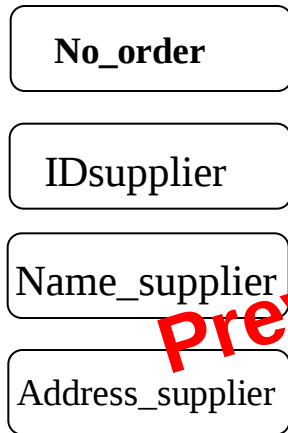


Diagram of functional dependencies in the relation SUPPLIER_ON_ORDER

Diagram of functional dependencies in the relation PARTS_IN_WAREHOUSE

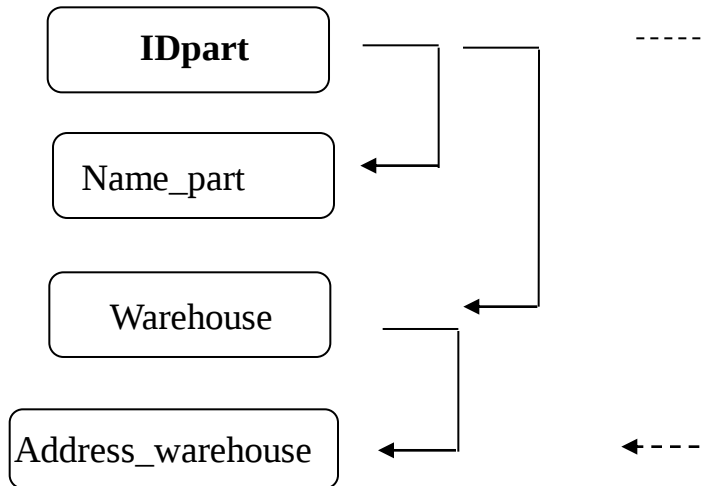
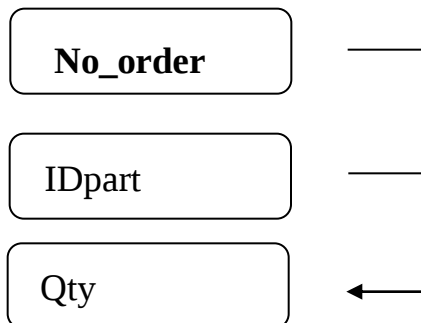


Diagram of functional dependencies in the relation PARTS_ON_ORDER

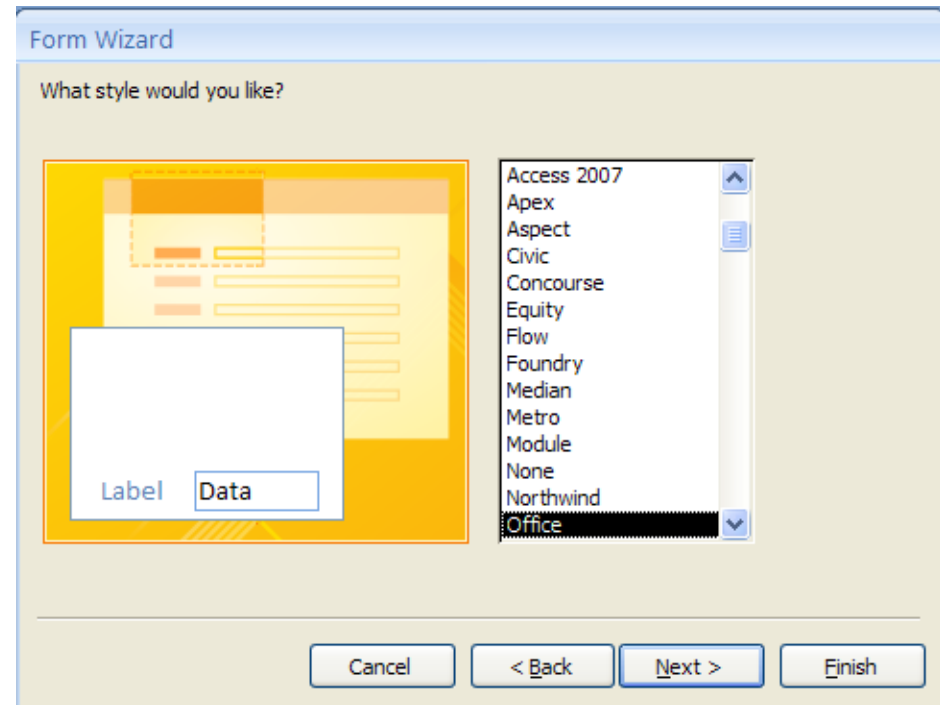
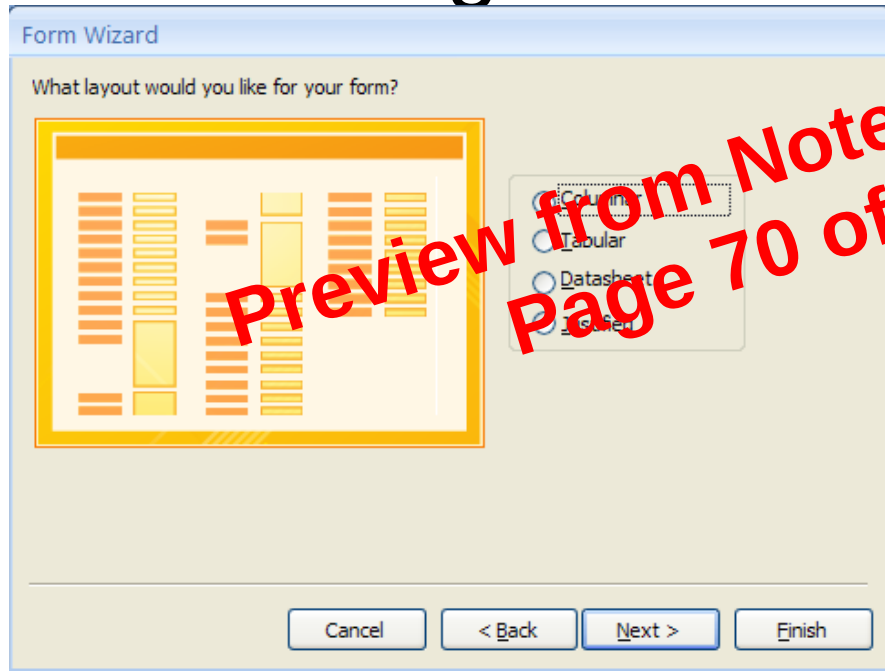


Grouping

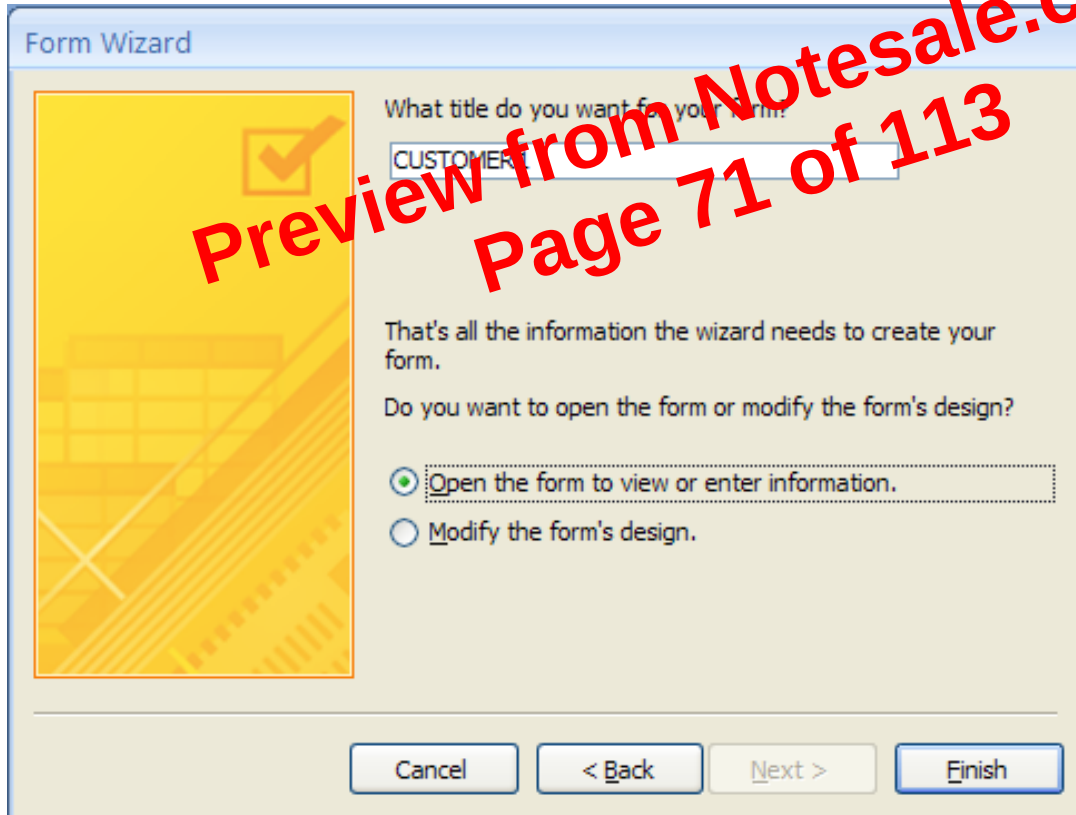
```
SELECT PubID, COUNT(*) AS [Number of books]
FROM BOOKS
GROUP BY PubID;
```

PubID	Number of books
1	6
2	4
3	4
4	1

Creating forms – the layout and style



Creating forms – the form title



The image shows a 'Form Wizard' dialog box. On the left is a yellow preview area with a checkmark icon. The main text asks 'What title do you want for your form?' with a text box containing 'CUSTOMER'. Below this, it says 'That's all the information the wizard needs to create your form.' and 'Do you want to open the form or modify the form's design?'. There are two radio buttons: 'Open the form to view or enter information.' (selected) and 'Modify the form's design.'. At the bottom are buttons for 'Cancel', '< Back', 'Next >', and 'Finish'.

Form Wizard

What title do you want for your form?

CUSTOMER

That's all the information the wizard needs to create your form.

Do you want to open the form or modify the form's design?

☒ Open the form to view or enter information.

☐ Modify the form's design.

Cancel < Back Next > Finish

The form can be modified in Design View mode.

Using a form

CUSTOMER1

CustID: 1

First_name: John

Surname: Smith

Record: 1 of 6 No Filter Search

Access to the existing records in the table CUSTOMER

CUSTOMER1

CustID: 8

First_name: Mary

Surname: Jones

Record: 6 of 6 No Filter Search

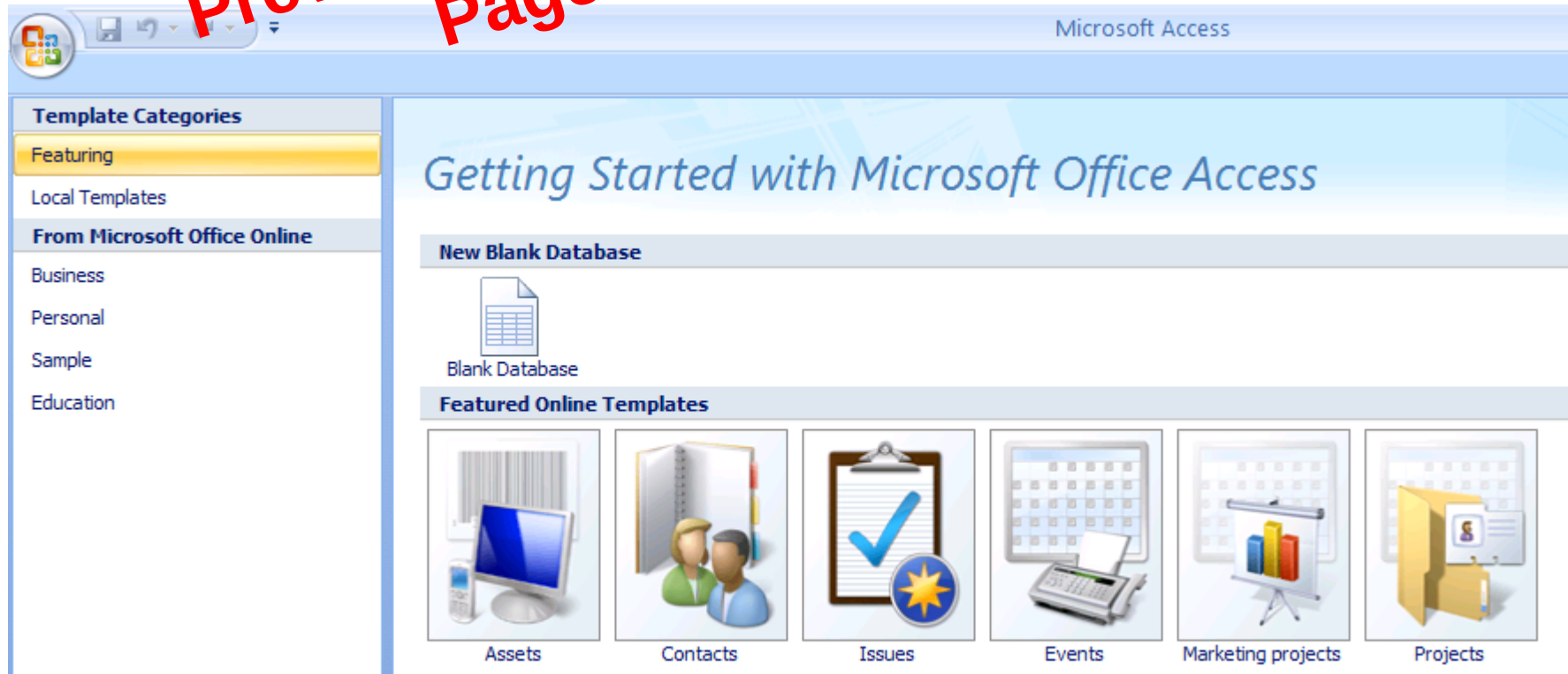
Input of a new record

	CustID	First_name	Surname
+	1	John	Smith
+	2	Anne	Brown
+	3	Henry	Eighth
+	4	Michael	Cooper
+	7	Lara	Croft
+	8	Mary	Jones
*	(New)		

Record: 1 of 6 No Filter Search

Trust a database for the current session

1. Start Office Access 2007, and on the **Getting Started with Microsoft Office Access** page, under **Featured Online Templates**, pick **Assets** to open the Assets template.



Package, sign, and distribute an Access 2007 database

Access 2007 makes it easier and faster to sign and distribute a database. When you create an .accdb file or .accde file, you can package the file, apply a digital signature to the package, and then distribute the signed package to other users.

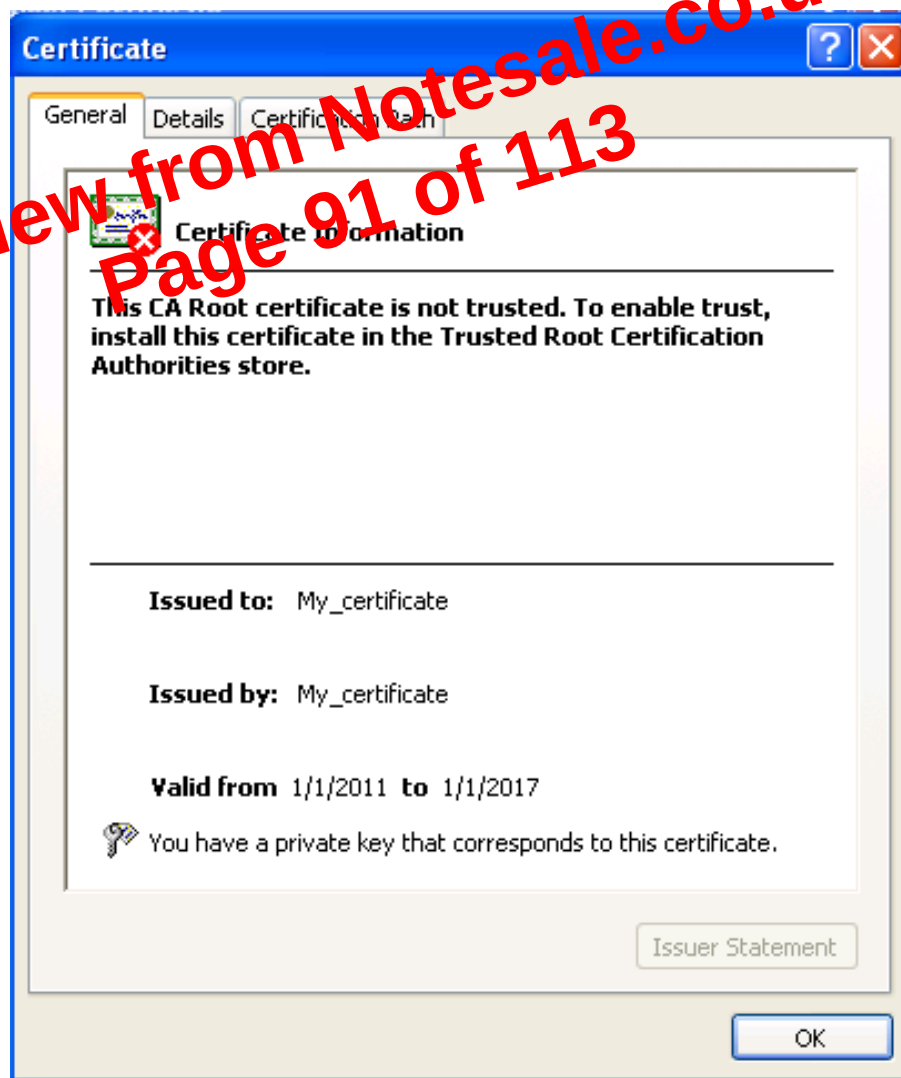
- ways to convey trust
- add only one database to a package
- signs all of the objects in your databases
- the process also compresses the package file
- a security certificate

Create a self-signed certificate

In Microsoft Windows, click the Start button, point to **All Programs**, point to **Microsoft Office**, point to **Microsoft Office Tools**, and then click **Digital Certificate for VBA Projects**



Create a self-signed certificate



New workgroup administrator

Instead of continuing to use the Admin user, we will disable the Admin user's abilities. The reason for this is that every workgroup file has an Admin user, so using it will make our database less secure. I like to name my new workgroup administrator something like PowerAdmin. Write down the new name and PID. Store this information offsite in a secure location.

6,7. New workgroup administrator

Re-Log into Access the new workgroup administrator that you created previously.

Up to this point, the new workgroup administrator doesn't have a password. You can set up a password for this account under *Tools | Security | User and Group Accounts | Change Log On Password*.